

CLAIMS

1. A method of manufacturing *n*-type semiconductor diamond, characterized in having a step of producing diamond incorporating *Li* and *N* by
5 implanting *Li* ions into, so that 10 ppm thereof will be contained in, single-crystal diamond incorporating 10 ppm or more *N*, and a step of annealing said diamond incorporating *Li* and *N* at a temperature in range of from 800°C to less than 1800°C.

2. A method of manufacturing *n*-type semiconductor diamond,
10 characterized in having a step of producing diamond incorporating *Li* and *N* by implanting into single-crystal diamond essentially not containing impurities *Li* and *N* ions, and so that ion-implantation depths at which the post-implantation *Li* and *N* concentrations each are 10 ppm or more will overlap, and a step of annealing said diamond incorporating *Li* and *N* at a temperature in range of
15 from 800°C to less than 1800°C.

3. A method of manufacturing *n*-type semiconductor diamond in which *Li* and *N* ions are implanted into single-crystal diamond, the *n*-type semiconductor-diamond manufacturing method characterized in that the ions are implanted so that ion-implantation depths at which the post-implantation
20 *Li* and *N* concentrations each are 10 ppm or more will overlap, and so that the *Li* and *N* sum-total dose is $5.0 \times 10^{15} \text{ cm}^{-2}$ or less.

4. An *n*-type semiconductor-diamond manufacturing method as set forth in claim 3, characterized in that an ion-implantation apparatus having an

electron-beam line and two ion-beam lines is utilized to implant the Li and N ions simultaneously while radiating with the electron beam the single-crystal diamond that is ion-implanted.

5 5. A method of manufacturing n -type semiconductor diamond, characterized in annealing post-implantation diamond at a temperature in range of from 800°C to less than 1800°C, under high-pressure conditions of 3 GPa or more.

10 6. Semiconductor diamond being n -type, characterized in incorporating, from a crystal face thereof to the same depth, 10 ppm or more of each of Li and N , and in that its sheet resistance is $10^7 \Omega/\square$ or less.